

CLAIMS

1. A method for simultaneously producing hydrogen and carbon monoxide, of the type in which a synthesis gas is received, such as a gas from hydrocarbon reforming, containing hydrogen and carbon monoxide, from a synthesis gas production unit (F), the synthesis gas is decarbonated in a decarbonation unit (2), and desiccated in a desiccation unit (5), followed by cryogenic separation of the remaining components in a cryogenic separation unit (6), characterized in that a gas containing at least 60% hydrogen consisting of:
- (i) a gas (7) from the cryogenic separation and/or
  - (ii) a portion (19) of the synthesis gas
- is recycled upstream of the decarbonation unit and downstream of the synthesis gas production unit.
2. The method as claimed in claim 1, in which the gas (7) containing at least 60% hydrogen is withdrawn at the top of a methane scrubbing column (K1) of the cryogenic separation unit (6), in which the remaining components are separated.
3. The method as claimed in claim 1, in which the gas containing at least 60% hydrogen is a portion of the gas with the highest hydrogen purity produced (7).
4. The method as claimed in claim 1 or 2, in which the gas containing at least 60% hydrogen (7) is used to regenerate the desiccation unit (5) before being sent upstream of the decarbonation unit.
5. The method as claimed in one of the preceding claims, in which the synthesis gas purified in the decarbonation unit (2) is compressed in a compressor (3) before being sent to the desiccation unit (5).

6. The method as claimed in claim 5, in which another gas enriched with hydrogen (17) is sent from the cryogenic separation upstream of the compressor and downstream of the decarbonation unit.

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7. An installation for simultaneously producing hydrogen and carbon monoxide comprising means for receiving a synthesis gas from a synthesis gas production unit (F), a decarbonation unit (1), a  
10 desiccation unit (5) and a cryogenic separation unit (6), and means connecting the synthesis gas production unit with the decarbonation unit, the decarbonation unit with the desiccation unit and the desiccation unit with the cryogenic separation unit, and means for  
15 withdrawing hydrogen and carbon monoxide as products, characterized in that it comprises means for recycling a gas containing at least 60% hydrogen consisting of:

(i) a gas enriched with hydrogen, in comparison with the synthesis gas, from the cryogenic separation  
20 unit and/or

(ii) a portion (19) of the synthesis gas upstream of the decarbonation unit (2) and downstream of the synthesis gas production unit (F).

25 8. The installation as claimed in claim 7, comprising compression means (3) downstream of the decarbonation means (2).

9. The installation as claimed in claim 7 or 8,  
30 comprising means for sending the hydrogen enriched gas to the desiccation unit (5).

10. The installation as claimed in 7, 8 or 9, in which the cryogenic separation unit (6) comprises a methane scrubbing column (K1), a stripping column (K2), a  
35 rectifying column (K3) and means for withdrawing the hydrogen enriched gas from the methane scrubbing column.

11. The installation as claimed in claim 10, comprising means for sending a gas (17) enriched with hydrogen from the stripping column (K2), downstream of the decarbonation unit (2).